Supersonic Neutral Winds in High-Latitude Thermosphere

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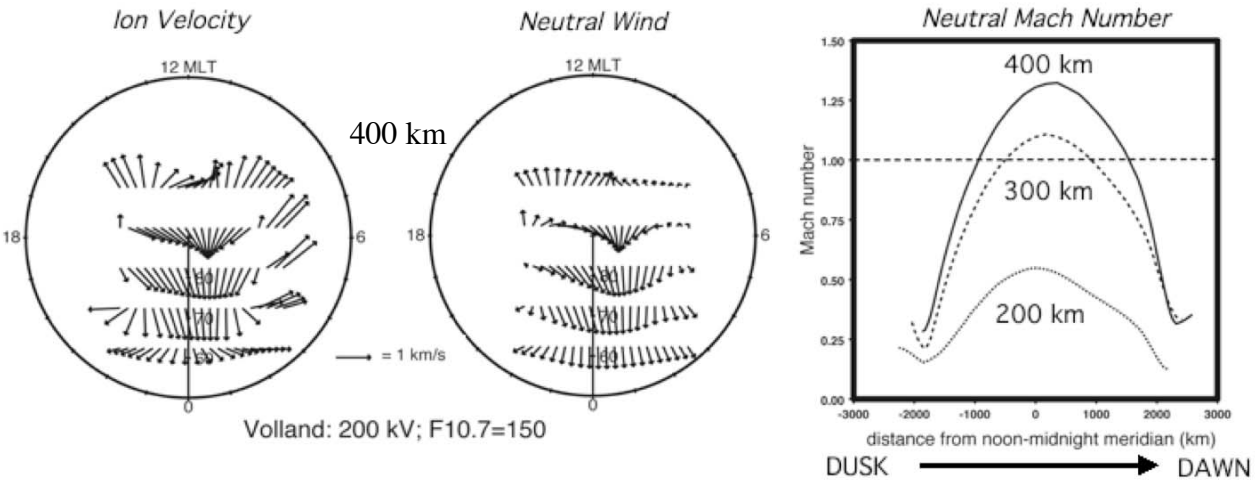
Supersonic neutral winds were observed on DE-2 primarily at high magnetic latitudes and in the altitude range from about 300-600 km. A time-dependent, three-dimensional modeling of the global thermosphere-ionosphere system, under HTP funding, have now simulated these winds for a range of background ionosphere, thermosphere, and convection conditions. Supersonic neutral winds were produced at altitudes above 200 km for cross-polar-cap convection potentials greater than about 150 kV, although supersonic winds mostly occurred above 300 km. The Mach number of the neutral winds was typically less than 1.5. The supersonic winds develop within one-half to three hours after enhanced plasma convection is imposed on the thermosphere-ionosphere system



Ion velocities, neutral winds and neutral Mach number profiles for equinox, moderate solar activity and a Volland 2-cell convection pattern with a cross-polar-cap potential of 200 kV. Mach number profiles are along a horizontal line that passes through the peak of the Mach number distribution.

Reference: Demars, H.G. and R.W. Schunk, Modeling supersonic flow in the high-latitude thermosphere, *Proceedings of the 2008 Ionospheric Effects Symposium,* JMG Associates, National Technical Information Services, Springfield, VA, 2008.